

AN 2
E S S A Y
ON THE
DISEASES OF THE BILE,
More particularly its
CALCULOUS CONCRETIONS,
CALLED
GALL-STONES.

By WILLIAM WHITE, F.A.S.

Non fingendum, aut excogitandum, sed inveniendum, quid
natura faciat, aut ferat. BACON.

Y O R K:

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P R E F A C E.

IT is surprizing, that so little mention is made in the writings of the most eminent authors, of the disease which is the subject of the following Essay.

Biliary calculi, or gall-stones, were altogether unknown to the ancients; but when the dissection of morbid bodies became more general, they were frequently met with by anatomists in the three last centuries, but they seem to have had no idea of the symptoms attending their presence in living subjects. Two of the most eminent physicians of our own country, Sydenham, and Mead, do not so much as make mention of them in their works; and the great Boerhaave only speaks of them as being sometimes the occasional cause of a jaundice, though we are told that he particularly recommended this disease to the notice of his pupils.

The celebrated Hoffman, Dr Simson professor at St Andrews, and the Baron

ron Van Swieten, first physician to the Emperor, give us some occasional remarks upon this disease, but upon the whole, short, and unsatisfactory. Dr Coe is the only one, as far as I know of, who has treated professedly upon the subject of biliary concretions. His work is chiefly a collection of observations from other authors, he made no experiments upon the nature of the calculi, sets out with declaring, he knows no method of dissolving them, and consequently places all his hopes of a cure in promoting their passage through the ducts into the bowels, and thence out of the body.

We are not to suppose this disease to be a new one, because many eminent men have passed it over in silence. It has, no doubt, as Dr Coe observes, been mistaken for an uncommon kind of cholic; for spasms from an hysterical, rheumatic, or gouty origin.

It is so far from being a rare disease, that it appears on the contrary to be a very common one; but seldom suspected, unless the patient quits the stones; then indeed the disease is obvious.

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vious. Dr Simfon believes the stone in the gall-bladder to be as frequent an occurrence as those in the urinary passages. And Professor Haller, at Gottingen, says, that the former is much more common than the latter, especially at that place, and expresses his ardent wishes, that a method of cure might be discovered for so frequent, painful, and dangerous a disease. I have heard an eminent physician declare, that he believed few people were exempt from them, that they were generally the cause of disorders of the stomach and bowels, and of the disorders usually called nervous; I have seen the event prove the truth of this opinion.

Authors who have treated of this disease, give us in general only the symptoms attending their passage through the biliary ducts; I have endeavoured to be more full in this part, to trace them from their first appearance, before the disease shews itself by more alarming and evident signs.

It must here be observed, that there are many instances of calculi voided by stool, which are of a real stony
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and gritty composition, resembling the urinary ones; containing no bile in their composition, and like them soluble in a caustic alkali. Totally different from those are the true biliary calculi, both as to texture, composition, and solubility. It is indeed doubtful whether the former comes from the biliary passages, they more probably are concretions formed in the pancreas, that viscus having been found full of calculi; or formed in the intestines, there being many instances of large intestinal calculi of a stony or gritty texture, having a real gall-stone for their nucleus. The true biliary calculi are only here meant, and whose nature and composition are explained in the following essay.

I thought it not amiss to begin with some general remarks upon the liver, not only to satisfy the reader not conversant with anatomy, but as the consideration of its attachments enables us to account for many symptoms arising from stones in the gall-bladder.

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ESSAYS

ON THE

DISEASES OF THE BILE,

OF THE LIVER.

IT will be unnecessary here to enter upon a minute description of this viscus, it may not however be amiss to mention its situation, connections, and use in the animal œconomy.

The liver is a large and pretty solid glandular mass, of a dark red colour, inclined to yellow, situated partly in the right hypochondrium, which it nearly fills up, and stretching across under the appendix ensiformis, or pit of the stomach, between it and the spine

spine of the back, it terminates in the left hypochondrium, into which it runs in some subjects a considerable way.

In its healthful state, it is covered intirely by the ribs, except where it passes under the pit of the stomach, in which part it is only covered with its own proper membranes, the abdominal muscles, and the common covering of the body.

Hence it may be easily felt in that part, when the body is put in a proper position for relaxing the abdominal muscles.

Its figure is irregular, being convex on the upper part, and unequally concave towards the back.

Its convex side is connected to the diaphragm by three ligaments. One at the extremity of each lobe, and one in the middle. The right ligament frequently connects the great lobe to the cartilages of the false ribs; the middle one is fixed to the rectus abdominal muscle. Besides these ligaments, the great lobe of the liver is also connected to the diaphragm by a broad and immediate adhesion,

adhesion. The middle ligament contains in its duplicature a thick white rope, like a round ligament coming from the navel, which was the umbelical vein in the foetus.

The right or great lobe of the liver rests on the right kidney; it likewise covers a portion of the arch of the colon, and the pylorus or lower orifice of the stomach.

These observations are very useful, as they assist us in accounting for many symptoms attending its diseases.

It is plentifully supplied with arteries, veins, nerves, and lymphatics, for the purposes of its œconomy, sensation, and nourishment. By means of the sympathetic or intercostal nerves, it is connected with almost all the contents of the thorax, and abdomen.

The use of the liver is very important, being the principal organ for the secretion of the bile.

The gall-bladder is a small bag, or receptacle of a pyriforme shape, lying in a depression upon the inner or concave part of the liver, towards the back, and verging a little to-

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wards the right side. From this cyst a small duct or canal is sent off, called the *ductus cysticus*, which being joined in its passage by another of the same kind, called the *ductus hepaticus*, as coming from the liver, forms the *ductus communis chelodochus*, which, after running a certain length, opens into the cavity of the intestines, a little below the lower orifice of the stomach.

The bile being separated from the mass of blood by the liver, is partly lodged in the gall-bladder as a reservoir, and partly runs through the hepatic duct in an uninterrupted stream into the intestines.

ON THE NATURE AND PROPERTIES OF THE BILE.

THE bile is a saponaceous fluid, of a deep or greenish yellow colour, a sweetish bitter taste, and is diffusible in water.

In its natural state it does not putrify more readily than the blood, but
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if diluted with watery fluids, it putrefies more readily. When putrid, the fœtor is not near so offensive as the stench of putrid flesh or blood; but something like stinking olive oil.

In its healthy state, it shews no tendency to acidity or alcalescency, but is in that respect perfectly neutral.

Alcalies have a tendency to dissolve the bile, rendering it very acrimonious and stimulating.

It is decomposed by acids, for being mixed therewith, a resinous matter is precipitated from it, having the peculiar smell of the animal, melting in a moderate degree of heat, insoluble in water, but is partly dissolved in ardent spirits. *Vid. Fordyce's elements.*

When putrid, it shows but little of an alkaline nature; but if it be submitted in this state to distillation, a volatile spirit may be drawn from it, of the alkaline class. *Vid. Macbride's experiments.*

We are however certain, that the bile is capable of contracting a putrid disposition, even in the body.

Sir John Pringle took a quantity of bile from the body of a gentleman 36 years

years of age, who died of a dropsey, following an obstinate jaundice. He divided it into three portions; to one he added fixed alkaline salt; but this occasioned no change in the colour, which was a dark green. Into another he dropped some spirit of vitriol; into the third, common vinegar; and observed in both these a manifest effervescence, with a change of the colour to a light green.

The bile has a power in some degree, of dissolving mucilaginous and resinous substances; but by what I have been able to observe, its action in this case is limited.

The bile is in strictness of two kinds, hepatic and cystic; the former is thinner, of a more dilute yellow colour, and less bitter; the cystic bile is more elaborated, of a thicker consistence, a deeper colour, and very bitter. But this being only the effect of absorption, and as they mix together in the common duct before they enter the intestines, they are in a medical view to be considered as one and the same fluid.

It is a very thin and dilute fluid when secreted, but acquires a greater consistence by lying in the gall-bladder,
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from the absorption of its more fluid part.

All vegetable bitters have a power of correcting acidity; the bile, or animal bitter, is found by Dr Pringle to possess the same quality.

As I imagine that considerable use may be drawn from this observation, regarding the theory and method of cure in many obstinate disorders of the organs of digestion; a short digression upon the nature of that animal process, may not be improper.

All animal and vegetable substances when bereaved of life, run into spontaneous fermentation, by which means their several component principles are separated, new combinations are formed, and fly off, leaving nothing at last but common earth, the ultimate basis of all sublunary bodies.

This fermentation is divided into three stages, from three remarkable phenomena attending the process: The vinous; the acetous; and putrefactive fermentation.

We shall instance this in the fermentation of vegetables. The first stage is called the vinous, a vinous liquor and ardent spirits being generated; to this succeeds

succeeds the acetous, the liquor being now sour and called vinegar; at length the putrefactive comes on, and the whole becomes thick, putrid, and stinking.

Animal substances, run into the putrid fermentation with great rapidity; there is no doubt but that they undergo the vinous and acetous ones, but these are so quickly dispatched as mostly to escape our notice; though we are told by travellers, that the Tartars of Siberia have a method of obtaining an inebriating spirit from milk.

During fermentation, a great quantity of air is detached, and flies off from the fermenting body; this is not the same with our common atmospherical air, but differs from it in many respects.

It is to be remarked, that it is the peculiar property of all ferments to assimilate all other fluids capable of fermentation, to their own nature.—Thus, a little yeast soon induces the vinous fermentation in any given quantity of fresh wort, &c. a little vinegar turns the whole sour; and a small quantity of putrid matter by bringing on the last stage, soon makes the whole offensive.

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But it is in the power of art to obviate these different stages of fermentation for a time, by the addition of bitters, which powerfully check this process; thus the acetous fermentation in malt liquors, is prevented by the addition of hops.

The degestion of the aliment in the stomach, is universally allowed to be a real fermentatory process, during which, all the different stages are in some degree gone through.

Sir John Pringle found by experiments, that the bile, though it accelerated the vinous fermentation, yet it agreed with the vegetable bitters in correcting acidity; for, says he, "I took notice, that though the bilious mixtures lost the usual rankness, acquired in the beginning of the fermentation, yet they never smelled or tasted sour after it was over."

Hence it appears, that the bile has the singular property of promoting the vinous fermentation, though it restrains at the same time the acetous and putrefactive ones.

Vegetable bitters have a very different effect, as they impede all the three stages of fermentation; for which reason

son, when given improperly, must hurt the digestion of our food. This seems to point out the reason, why vegetable bitters when given in cases of interrupted excretions of the bile, in order to supply its place, are not found to answer.

I am so well assured of the importance of these remarks, towards thoroughly understanding the theory and cure of diseases of the stomach and bowels in general, and in particular the symptoms attending the disease which is the subject of this essay, that I trust no one will think the digression needs an apology.

THE USE OF THE BILE.

THE bile was anciently thought to be a fluid meerly excrementitious, a noxious humour seperated like the urine from the mass of blood, for the preservation of the body in health.

But a more enlarged knowledge of the structure of the body in its healthful state, as also of the changes induced

duced therein by diseases; a diligent and attentive inquiry into the alterations which take place in consequence of the passage of the bile into the intestines, being either impeded, or totally intercepted, shew that fluid to be of great consequence to the well being of the body, and of very important use in the animal œconomy.

The use generally attributed to the bile, as being the most obvious, is in mixing together the oily and watery parts of the food by its saponaceous quality; as being a powerful solvent of the more fibrous and solid part of the aliment, and by that means rendering it a smooth and homogeneous fluid.

If we consider the changes that take place in the bowels, when they are deprived of the salutary influence of the bile, its more important uses seem to be.

1. A constant stimulus, peculiarly adapted to the bowels, in order to keep up their peristaltic motion. Costiveness is a constant attendant of an impeded excretion of the bile.

2. An Antizeumac, or checker of fermentation, a fluid provided by nature

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ture to retard the acetous and putrid stages from taking place too soon. When the passage of the bile into the bowels is interrupted, the alimentary canal is always oppressed with flatulencies, and eructations, heart-burn, &c. symptoms of a prevailing acid; from this cause in a great measure proceed the diseases to which infants are liable, their bile being very thin and inert.

DISEASES OF THE BILE.

BY what has been said above of the nature and properties of this fluid, as also its use in the animal œconomy, it seems that the first signs of its being diseased, will appear in the organs of digestion. Hence, in disorders of the stomach and bowels, we ought always to have some attention towards the use and condition of this important fluid.

The bile may be disordered many ways, either in quantity or quality.

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When it is secreted or excreted in too plentiful a manner, but still retaining its healthful qualities, it seldom occasions great uneasiness; but goes off in a spontaneous bilious diarrhœa.

It may be secreted too sparingly for the purposes of the œconomy; this will be the cause of many obstinate diseases, with all the consequences of an imperfect chylopoësis.

It is de ceased in quality, chiefly by contracting a dangerous acrimony, either acid, alkaline, or putrid. The consequences of these morbid conditions of the bile are easily understood, if we have a just idea of its nature, properties, and use in an healthy state.

The symptoms of an acid tendency in the bile, are flatulencies, acidities, crudities in the first passages, loose stools of a pale yellow colour, or greenish with a sourish smell; cardialgia, voracious appetite, spasms, an imperfect assimilation of the chyle; hence, a thin poor watery blood, acid sweats, the blood being in this state incapable of properly stimulating the animal solids, gives rise to obstructions,

obstructions, stagnations of the fluids in their vessels, cachexies, dropsies, &c.

It may be indeed disputed whether the bile can become acedcent, for these symptoms equally attend its too weak or inert state.

The prædisposing and occasional causes to this disease, are, 1. A natural weakness, or debility of the system in general. 2. Too sedentary a way of life. 3. Too glutinous and inert aliment; as fish, fat and mucilaginous meats, especially boiled. 4. The abuse of vegetable diet, and fermented liquors; as wines, and those from malt; all those readily run into fermentation in the stomach. 5. An excessive use of acids; this, many young ladies have sadly experienced, and lost their health in the pursuit of a fine shape. 6. Every cause, capable of weakening or relaxing the tone of the stomach in particular.

Hence, the method of cure spontaneously arises; which is to be attempted by a diet and medicines that are stimulant, strengthening, contrary to acid, impeding fermentation.

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The diet should be chiefly solid, consisting of roasted, fried, broiled, and salted flesh meats, especially such as contain much essential oil, as wild fowl of all kinds. The drink chiefly spirituous, of rum or brandy properly diluted. Abstinence from vegetables and acids. A diligent observance of proper exercise.

Directly contrary to this state, is that in which the bile has contracted an alcalescent acrimony; in which case it is rendered very acrid, pungent, and irritating.

The symptoms which indicate such a condition of the bile, are constant thirst; sense of heat in the stomach, bowels, and other parts of the body; nidorose eructations; foetid breath; a bitter, or sulphureous taste in the mouth; loss of appetite; nausea, and reachings to vomit; evacuations upwards and downwards of a dark coloured, or very yellow, thin, and frothy bile, very foetid and offensive; colic pains; the white part of the eyes have a yellowish cast, and the urine is small in quantity, and very high coloured. The body wastes away by slow degrees, the healthy suffusion

fusion of red in the skin being vanished. Erysipelatose, and other kinds of inflammations, and violent fevers of the putrid class, are the consequences of its continuance.

Its prædisposing and occasional causes are, *1st*. A naturally robust and bilious temperament of the body. *2^d*. A too constant use of animal food; especially when roasted, high seasoned, and kept so long as to verge upon putrefaction. *3^d*. A neglect of vegetable diet, farinaceous food, and acids. *4th*. A constant drinking of spirituous liquors, as they are incapable of fermentation in their own nature, and universally impede that process in other bodies.

The cure is performed by medicines counteracting putrefaction, and such as obviate the putrid acrimony. By mild and demulcent food, especially white meats, chiefly boiled, and broths made from them. A milk, and vegetable diet; here we include the use of recent vegetables, as salads, and all kind of fruits. The drink must be of fermented liquors, and not sparing, as wines, malt liquors, cyder, perry, &c. of the wines,
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our domestic ones are to be preferred, because they contain less spirit, and more fermentable matter than the foreign ones. To these must be added, rest of body, and sometimes the use of the warm bath.

A real putrid state of the bile is seldom to be observed, and must be incompatible with animal life.

The bile may also offend in its degree of spissitude or consistence. It may be excreted in too thin a state; to which two causes chiefly contribute.

1. A too watery and acescent diet, by which it is greatly diluted, or its texture in some degree destroyed. In this case, the symptoms and method of cure, have a near connection with what has been said in treating of the acescency of the bile.

2. A morbid, or too great irritability of the system in general, or biliary passages in particular; by which means the bile is thrown off too soon, before it hath had time to contract a proper degree of consistence by the absorption of its more fluid part.

This is frequently the case in fevers, in which there are great evacuations
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of bile upwards and downwards. The cure is effected by smooth demulcent diet, anodynes, and medicines which have a power of diminishing irritability.

The bile may, on the other hand, contract too great a consistence in its passages. It has at times been found nearly resembling pitch.

This proceeds from every cause capable of stopping up its passage into the intestines ; so that by its delay in the gall-bladder, it loses its fluid partly by absorption. The cure of this disorder of the bile varies according to its cause, but as it is in some measure allied to biliary calculi, we shall say no more of it in this place.

The jaundice is not in strictness, a disease of the bile, but a consequence of it only. For which reason, we shall only treat of it in a general manner, as far as is necessary for understanding what may follow hereafter.

When the bile regurgitates, and is thrown back again into the mass of blood, in consequence of its excretion or passage into the intestines being impeded or stopt, the disease is called a jaundice.

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The causes that may stop the excretion of the bile, and thus be occasional causes of a jaundice, are manifold.

1. The bile may become too viscid to pass through the ducts; but this is not very frequent, nor will it last long.

2. Concretions, or collections of hard fæces in the duodenum, may stop up the orifice of the duct, but this will be only transient.

3. Spasms of the ducts themselves; as being muscular and nervous parts, and endowed with great sensibility. Thus we are told of sudden jaundices from violent fits of anger, as also happening to people subject to hysterical and hypochondriacal affections. To this Dr Mead attributes the yellowness of the body in consequence of the bite of a viper; but this seems rather to proceed from a putrid dissolution of the blood, induced by the septic nature of that poison.

4. Compression of the ducts by swellings, inflammations, and schirrous affections of the parts adjacent; as the liver, the glands about the upper part of the duodenum, pancreas, &c. These are for the most part incurable, but

happen rarely. 5. A contraction, or adhæſion of the ſides of the ducts together; this is an incurable caſe, but very uncommon, Dr Monro never ſaw it but once.

6. Biliary calculi, or gall-ſtones in the bladder, or common duct; this is the moſt common cauſe of all others, and allowed to be the caſe at leaſt nine times out of ten. We are to obſerve, that when the ſtones are in the gall-bladder, or cyſtic duct, the patient may have no jaundice, becauſe a quantity of bile is always paſſing through the hepatic duct into the bowels; but when they are in the common duct, formed by the junction of the two former; a jaundice muſt follow, as neither the cyſtic or hepatic bile can paſs into the inteſtines.

Hence we may ſee, that a jaundice is incurable in its own nature in ſome rare and uncommon caſes; which ſhews the preſumption and folly of thoſe who pretend to univerſal remedies.

Having now premixed what was thought neceſſary for underſtanding the

the chief subject of this essay, we shall proceed to it without delay.

UPON THE NATURE AND COMPOSITION OF BILIARY CALCULI.

BILIARY CALCULI, or gall-stones, are not as is generally imagined, meer inspissated bile, or a fortuitous concretion or coagulation of its more gross and dreggy parts; but curious and regularly formed compound bodies.

They are composed for the most part, of various concentric coats or layers, formed round a nucleus or center; the layers are frequently of various colours, green, red, black, or yellow, the nucleus is usually black. If one of them be divided in the middle and polished, the different coloured coats make a beautiful appearance. Sometimes they are found to shoot in the form of radii, their nucleus being the center; but this is not very frequent. When the stone is formed of several small ones adhering

ring together, every one of the last has its own proper center; in this they resemble the urinary, and other kinds of animal calculi.

Their surface is generally of a brown colour, sometimes black, resembling jet; at others, though less frequent, of a white colour. Heister took one out of the gall-bladder of a woman, of the size of a wall-nut, of a reddish yellow colour, resembling a piece of gamboge.

They differ very much in their degree of consistency. Some of them being so soft as to yield to an impression made with the fingers; in general you may crush them to pieces with a moderate force, but are sometimes so solid as to require a smart stroke of a hammer to break them. Regarding their texture, they are generally so soft, that you may easily shave them with a knife, like a piece of hard Venice soap, they have now and then been observed so hard as to resemble marble, but are mostly friable and brittle.

They are for the most part of small specific gravity when compared with their bulk; most of them swim in water,

ter, some on the contrary immediately sink when put therein.

Their surfaces are usually very smooth, and as if polished; this is more particularly the case when several are contained together in the gall-bladder, as by their mutual friction they polish each other. Sometimes they are scabrous and rough, especially when solitary. Their surfaces have frequently a granulated appearance, and have at times been covered over with beautiful sparkling particles like chrystallized salts. We have an instance in the philosophical transactions, of one curiously incrust- ed over with chrystals of various figures, conical, cubical, pyramidal.

They vary much in their figures; being for the most part more or less angular, or approaching to the cuboide form. This is undoubtedly occasioned by their mutual pressure upon each other, and almost infallibly shews them to be numerous. When they are of a perfectly round, or oval shape, without dint or impression upon their surface, they are generally solitary.

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They are also found of very different sizes, some like large pin-heads, the common size is from a pea to a large hazel-nut; but they have been frequently found as large as pigeons eggs. There have been cases, where one single stone has filled the whole gall-bladder.

Their number is no less uncertain in different subjects, being found from one calculus to some hundreds in one single patient. Sometimes one large gall-stone is found composed of several small ones cohering very fast together. Dr Oliver took one of a pyriform shape out of the gall-bladder of an old lady, which was composed of above a hundred small stones, of various irregular figures, each having cavities in which they received the convexities of their neighbours, and *vice versa*.

They generally melt and inflame very readily in the fire, or flame of a candle, leaving a small quantity of calx behind; others do not so easily inflame, but rather melt like wax.

SYMPTOMS

SYMPTOMS OF STONES IN THE GALL-BLADDER, AND DUCTS.

WE shall endeavour in this account to begin as early as possible in the disease, and enumerate the symptoms attending biliary concretions in their state of formation, when they first begin to disturb the functions of the body.

In order to explain this more fully, I have divided the symptoms into three different stages, the first, second, and third, or last stage; as they differ much from each other, and in some cases require different methods of treatment in the curative part. In the first stage of the disease, I suppose the stones to be only forming. In the second, they are perfectly formed, but still in the bladder. In the last, they are forcing a passage through the biliary-ducts, into the bowels.

The symptoms will differ and be more or less distressing, according to the
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the constitution of the patient; the greater or less irritability of his system. The number or size of the stones, their shape, gravity, roughness, situation in the bladder or ducts, &c.

It can hardly be expected that stones in the gall-bladder, can ever become so far the object of the senses, as to become manifest to the touch. Yet Lentilius, physician to the Duke of Wurtenburgh, mentions a case in which the gall-bladder was so distended with them as to cause a manifest tumour externally on the right side, below the cartilages of the ribs, just in that part where the gall-bladder is situated. And Monsieur Petit says, the stones may be felt externally in some cases, in patients that are lean, when they are either very large or numerous. But such instances are very rare.

The signs of the first attack of this disease are rather obscure, and generally attributed to some very different cause; the stomach and bowels are usually the first parts that suffer, when there is neither pain, or any other more obvious symptom to lead to the supposition of gall-stones.

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The symptoms of the first stage are, loss of appetite, an unusual sensation of faintness at the stomach, especially when fasting, or if they have not more frequent repasts than usual in perfect health. Rumbling of wind in the stomach and bowels; sour, sometimes nidorse eructations; sudden dislikes to particular kinds of food; heart-burn; palpitations of the heart; lowness of spirits; tremors; and the whole train of symptoms generally called nervous.

Nor, shall we be much surprized at this, when we duly consider that the stomach and whole alimentary canal, is endowed with greater sensibility and irritability than almost any other part of the system. That it is more sensibly affected by irritation of other parts of the body than any, except perhaps the sensorium. It is well known that the gout, though in the extremities, has a great consent with the alimentary canal, and is generally produced by some affection of it; many people know the approach of a gouty fit by symptoms similar to those above mentioned. A fit of the stone in the kidneys or ureters is frequently preceded

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by, always attended with similar disorders of the stomach and bowels.

Hence it is no wonder that these parts should suffer very early, in consequence of an irritation of the biliary passages; as they are situated almost in contact with each other, and sympathize together by connection of parts.

The symptoms of this stage arise, partly from a spasmodic affection of the stomach and bowels, the consequence of irritation in the biliary passages; and in part, from a diseased state of the bile, by which digestion is not properly performed. They will be generally esteemed hysterical, and as they give not much light into the primary disease, we shall preceed to the second stage, in which it is more evident.

The patient now complains of heavy, seldom acute, yet very fainting pain, in the region of the liver, for the most part exactly under the pit of the stomach, but deep seated; and of a sensation as if a chord was fixed from that part to the navel, and forcibly stretched. The pain generally strikes up as from a center, to the spine

spine exactly betwixt the scapulæ; sometimes down to the right kidney, and to all parts in vicinity with it.

The pain has always its remissions, and generally intermits. In which last case, the patient can frequently foretell the fit by an odd kind of rotatory sensation about the pit of the stomach, not easily described. It is always attended with a convulsive contraction of the bowels towards the affected part; with flatulencies, to so remarkable a degree, that the patient refers the greatest part of his sufferings to that symptom alone; eructations, Borborygmi, and intolerable faintness.

When the pain has compleat intermissions, it has a surprizing tendency to return at certain regular periods; frequently once every twenty-four hours. I knew one case, where the pain came on for some time together about eight in the evening; in another patient, about ten at night; in a third, at two in the afternoon. But they frequently have smart returns of pain at other times, though of short continuance, compared with the chief fit.

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The patient, when in the fit, is incessantly changing postures, in hopes of some degree of ease; and generally finds most relief when sitting in a stooping posture with his knees raised, which he embraces. In this position the belly becomes pendulous, by which the weight of the liver, and other adjacent viscera, is in part taken off from the gall-bladder.

The patient has great anxiety about the præcordia, cardialgic anguish, great acidities in the stomach, nausea; reachings to vomit, especially in a morning when the stomach is empty; if any thing is brought up, it is generally little in quantity, sour or frothy, sometimes mixed with a small portion of bile. The body is for the most part costive, with whitish clay coloured stools; sometimes they are of a deep brown colour. They have frequently a loose stool or two when the fit is over, to which the patient attributes his relief; this seems to be merely the consequence of the preceding irritation, and shews the abatement of the spasms.

The urine, during the fit, is mostly clear and pale; but after it is gone off,

off, high coloured, becoming turbid when cold, with a dilute pinky sediment. As the disease advances, it is of a deep flame-colour, turbid when cold, and of a dark chocolate hue; sometimes nearly approaching to black, with a copious sediment; and will frequently tinge a linen rag yellow.

The colour of the face is at times very little altered, and the patient often keeps his natural degree of corpulency, in so much that it is surprizing how healthful the patient is to appearance considering his great sufferings; but if the white part of the eyes be carefully examined, a yellowness may generally be perceived therein. But in general the countenance becomes pale, fallow, yellowish, and cachectic; the body gradually wastes; the eyes appear sunk in their orbits, with a brownish circle round them.

The patient has usually more or less pain in the right shoulder or arm; a symptom common to most diseases of the liver. It is generally overlooked by the patient, or attributed to a rheumatic cause; but its not yielding
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to remedies proper in such cases, shews that it derives its origin from a very different source, and is so constant an attendant upon stones in the gall-bladder, that it will assist with the concurrence of other signs, to ascertain the disease. Dr Baglivi, in his treatise *De bilis naturá*; gives us an account of a patient of his, who was afflicted with most violent pains in his right arm for upwards of a year before his death; his body being afterwards opened; no disease appeared, except that two large stones were found in his gall-bladder. His countenance had been for several years of a pale citron colour, more especially the white part of his eyes, but the pain in his right arm yielded to no kind of remedies. Other instances of the same kind, are recorded by medical authors.

This stage of the disease sometimes continues for several months, or even years, according as it is more or less violent. If the patient quits no stones, or obtains only temporary relief, his strength at length fails, and being wore out with sickness, pain, and dejection

dejection of spirits, a dropſy generally cloſes the ſcience of life.

Huldenreichius, in the *Acad. nat. curios.* makes mention of a woman who, for upwards of thirty years, endured ſo much pain, that ſhe imagined ſhe had a viper within her. — Being opened after her death, every part appeared in a healthy ſtate, except that there was found a very large ſtone in the gall-bladder.

Hoffman, *Obſervat. Lib. xix.* gives us the caſe of a man, in whoſe gall-bladder were found ſeveral hundred ſmall calculi. This perſon, for the laſt twenty years of his life, had ſuffered the moſt violent pains, with a ſenſe of great heat about the pit of the ſtomach, and heart-burn.

If the ſtone be ſingle and very large, or compoſed of many ſmall ones adhering together, there can be little hopes of its ever paſſing the duct; the patient muſt conſequently, unleſs a method of diſſolving the ſtone be found, paſs the remaining part of his life with more or leſs of the ſymptoms of the ſecond ſtage. If on the other hand, the ſtones be detached from each other, ſmall in ſize, and the

the ducts easily dilatable, they endeavour to force their way into the bowels, which is an effort of nature to free the body of the disorder, and composes the third or last stage.

When we consider the small diameter of the biliary ducts which the stones have to pass through from the gall-bladder to the intestines, their intorted shape, the impediments to dilatation from the density and firmness of their membranous and muscular coats, the long passage of the end of the common duct between the coats of the intestine before it opens into it; we are not surprized at the extream violence of the symptoms attending their passage.

There are not wanting instances of people passing a number of gall-stones with very little pain, owing to a favourable combination of circumstances. Some have passed with equal ease, stones of a considerable magnitude from the urinary passages, but this is the fortunate condition of few.

The symptoms of the third stage, or when the stone is actually forcing its

its passage through the biliary ducts into the intestines, are as follows: The patient is commonly seized with a sudden cold or chilly fit, or spasm of the external surface of the body; this seldom continues long, but returns very frequently. He complains of a most violent and acute pain about the pit of the stomach, but deep seated, which shoots up towards the shoulders, and downwards to the small of the back, by which not only the viscera of the abdomen, but of the thorax too, are violently affected with strictures, and drawn forcibly towards the affected part. The pain is generally attended with extreme sickness, and incessant reachings to vomit, by which a small quantity of frothy matter mixed with bile is brought up; yet I have known some patients who had neither of these symptoms, although the pain was so violent, that they seemed upon the rack. The extremities are quite cold, and a cold sweat is seen like a dew hanging upon the forehead and breast. Sometimes they faint by reason of the excessive torture, and lie for some time in a state

of insensibility; at others, they have convulsive contractions, and a disposition to a delirium, but of the comatose kind, and a jaundice comes on suddenly.

They complain of being almost burst with wind; of great faintness; difficulty of respiration; inexpressible anguish; and cannot remain one moment in the same posture. The body is generally costive, and the urine high coloured, and in small quantity.

In the very worst of these fits, I have been surprized to find so little alteration in the pulse, and the small disposition to a fever. The only alteration observable is, that the pulse is smaller and more contracted than when in health, and the tongue a little whiteish.

These symptoms usually continue with remissions until the stone is got out of the duct into the intestines, and end with great gripings and purging of thin bilious stools. The skin becomes soft and moist, the extremities warm, urine lighter coloured, with a white or lateritious sediment, the pulse soft and full; to
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which succeeds, a warm breathing sweat, and a remission of all the symptoms.

But if the pain continues very long, intense, and sharp; the whole nervous system is dreadfully affected with convulsive motions, distension of the limbs and joints, epileptic spasms. If to these be joined the symptoms of fever, a quick hard pulse, a very rough and dry tongue with great thirst, we have too great reason to suspect a large, hard and rough stone to be firmly fixed in the biliary ducts, which, if it cannot be dissolved, will soon hurry the patient out of the world.

The patient is often sensible of the dropping of the stone into the bowels; sometimes they have a sensation as if something had broke within them, and as if water was flowing within from the consequent free passage for the bile.

The stone being, during the fit, discharged out of the ducts into the intestines, is evacuated quite out of the body by stool. It has happened, that the stones have been brought up by vomiting.

The learned Dr Huxham,

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in a letter to Dr Coe, gives two instances of the latter, in the cases of two gentlewomen who, after several days incessant torment of cholic, vomiting, jaundice, &c. threw up several gallstones from the stomach, and afterwards recovered. They are indeed dreadful cases, proceeding from the extreme violence of the spasms, by which the natural order and motion of the stomach and bowels are reversed.

The accurate Dr Sydenham seems to have had not the least knowledge of this disease; yet the following account of symptoms shews us, that he had frequently seen it, which he supposes to be an hystERIC cholic.

“ Nonnunquam, (says he) in colon,
 “ et regionem scrobiculo cordis sub-
 “ tensam impetum faciens, dolorem
 “ vix ferendum infligit, iliaca passi-
 “ oni haud absimilem; ubi ægra
 “ immodicè vomit, colluviem quan-
 “ dam viridem, nunc etiam insoliti
 “ alicujus coloris, rejiciens. Sæpè
 “ etiam postquam ægra ad multos
 “ dies jam dicto dolore (qui vel sto-
 “ icorum ~~anæsthesia~~ expugnaret) et con-
 “ tinuo vomituritionis conatu tan-
 “ tum

“tum non fuerit enecta, tandem
 “ictero intensiore omnem corporis
 “superficiem ad instar croci tergen-
 “te, solvitur paroxysmus.”

And indeed, the following remark gives some reason to think, that biliary concretions were no less common in very remote ages than at this day, but the unfrequency of dissections, keep them in ignorance as to the cause.

“Qui lumborum et lateris dolore
 “absque ulla occasione tentantur,
 “ii in morbum regium incidunt.”—

Hippocratis Coi, Coac. Prænot. Sect. 2.

Having now finished the account of symptoms attending stones in the gall-bladder; we next proceed to the prædisposing and occasional causes of that disease.

PRÆDISPOSING CAUSES.

In order to ascertain this, we must be well acquainted with the different substances of which gall-stones are composed; and it is by experiments alone,

alone, that this is to be acquired. Biliary calculi have been generally thought to be meer concretes of coagulated or inspissated bile; but they appear from various experiments made upon them, to be regularly formed compound bodies, consisting of a large proportion of a saline matter, a quantity of bile, and sometimes a small portion of earthy matter.

Saline bodies in general, have a very strong attraction to other bodies, readily combining with them, and forming various kinds of compounds.

Hence, I suppose the cause which prædisposes the body to calculous concretions, to be a peculiar idiosyncrasy, or constitutional disposition of the fluids of an animal body to form chrySTALLIZATIONS, or generate a quantity of saline matter. In whatever part of the body these saline particles are generated, being assisted by the concurrence of occasional causes, concretions will be formed; by reason of the attraction of the saline particles to every kind of matter with which they happen to be in contact.

Thus, the combination of this saline matter with the bile, forms gallstones;

stones; with the earthy part of the urine, it forms calculi in the urinary passages. And this equally takes place in other parts of the body; for stones have been found in almost every part of the body, in all the viscera of the abdomen, the lungs, the heart, and even the brain itself. Analogous to these are the stony concretions in the salivary ducts, the tartar of the teeth, the grittyness observable in some kind of tumours, and the chalk-stones in the gout.

This hypothesis is greatly strengthened, by observing, that few patients have any one of these disorders singly, or without some of the other being present.

Very few labour under biliary calculi, who are not subject also to stones in the urinary passages; I never saw an exception to this, but I have not had an opportunity of seeing a sufficient number of cases to establish it for a certainty. How frequently the gout and stone are joined together in the same patient, or rather how inseparable they are, is sufficiently known. Hoffman gives us an instance of stones found in both the biliary
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and urinary passages, of an old man who had been much subject to the gout. Many more examples of the same kind are to be met withal.

OCCASIONAL CAUSES.

THESE seem to be chiefly three, a too sedentary way of life, passions of the mind, errors in diet. Of which we shall give a brief account in their proper order.

It is the good effect of exercise, to encrease the tension and spring of the animal solids, by which their action upon the fluids is invigorated. Hence, the circulation of the blood, all the various secretions and excretions are carried on in a free and uninterrupted manner; by which the body is strengthened; a free and uniform flow of spirits, good appetite, and easy digestion are the consequences.

Directly contrary to these, are the effects of an idle and too sedentary life.

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The neglect of muscular motion, by inducing a weakness and diminished tension of the solids, lays a foundation for a number of diseases. The fleshy or muscular fibres are rendered torpid and unfit for motion, incapable of propelling forwards their contained fluids with due velocity; hence stagnations, inspissations, concretions are formed, the body becomes loaded with fat, or swelled with dropsy.

The formation of calculous concretions in the body, necessarily presupposes a degree of stagnation of the fluids in the affected part; this is absolutely required to favour their combination. A strong action of the vessels and consequent brisk circulation of their enclosed fluids, effectually prevent attractions of this kind from taking place. Those who are in the flower of their age, or use sufficient labour and exercise, are generally exempt from all kind of calculous disorders, gout, &c. This seems to be the plain and true reason why diseases of this class are so very frequent among men whose incomes put them above the necessity of labouring for
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their bread; but seldom seen in the more humble walks of life.

Inactivity of body has so great a tendency to favour the formation of gall-stones, that the learned Baron Van Swieten ranks this disease among those to which the learned and studious are particularly liable. And very justly remarks the compressing of the viscera of the abdomen, by sitting at their studies in a stooping posture with the stomach pressed against a table, or desk, to be a concurring cause. This must greatly disturb the functions of the adjacent viscera, especially the liver, and impede the circulation and natural motions of their several fluids, more particularly when done soon after meals.

Passions of the mind produce very sensible effects in the body, particularly anger and fear. These generally affect the stomach and bowels, and by disturbing their natural offices in the œconomy hurt digestion; hence arise acescency, crudities, a disordered chylication, obstructions in the viscera, and various chronic diseases. Anger is thought to have a particular tendency to affect the biliary passages,
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and produce strictures in the stomach and duodenum.

Regarding errors of diet, it is unnecessary to enter upon the subject in this place; as we have pretty fully discussed that point in a former part of this essay, treating of the diseases of the bile.

The learned Baron, mentioned above, says, that spirituous liquors tend to the production of calculi, partly by their coagulating quality, and partly by their heating the body, and thereby dissipating the thinner parts of the fluids. But by a number of experiments made upon this subject, I am led to believe that ardent spirits, especially when properly diluted, have a contrary effect.

Dr Fordyce found by experiment, that acids decompose the bile, and precipitate a kind of resinous matter from it. We are hence led to suspect the preposterous use of acids, and to conclude them to be at times an occasional cause to this disease; for if the solid parts of the bile be separated from the more fluid combinations will easily form.

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All kinds of fermented liquors come under some suspicion, as giving off a great quantity of fixt air, which seems to be the vinculum, or bond of union in calculous concretions. Wines also contain in themselves a great quantity of saline tartarous matter, the roughness and astringency of the red kinds are to be suspected.

It may not be amiss in this place to remark, that the prædisposing and occasional causes of diseases cannot produce any effect separately; but must be combined together; this distinction is of great consequence in practice, too seldom attended to, or confusedly jumbled together. We shall instance this in the gout, a disease in which inattention to this point has caused much confusion, and even contradiction among medical writers. The predisposing cause to which disease is unknown as to its nature, but is certainly interwoven with the original stamina of gouty bodies, an hereditary disposition communicated from the parent to the offspring, but can never appear in the form of a disease, till roused up into action by the assistance of occasional causes; thus the seed of

a vegetable contains in embryo the rudiments of the future plant, but in order for vegetation, moisture and a proper pabulum it required, if the seed be denied this assistance no plant is formed. So it is often in the power of art by avoiding of occasional causes to prevent what is called the gout, but the causes which predispose the body to this disease will still remain latent in the habit,

Having treated, and that pretty fully, of the nature of gall-stones, their symptoms and causes, we next proceed to the curative part,

METHOD OF CURE,

STONES in the gall-bladder are a disease which has been generally esteemed incurable,

The excellent Baglivi is very positive in his prognostic: "Quare cum
 "icteros videris pertinaces, vel sanatos
 "sed recidivantes, pro certo habeamus,
 "eos a calculo vesicæ felleæ
 "progigni,

“ progigni, ac proinde incurabiles
 “ prædicito, quod cadaverum sectio-
 “ nes te docebunt.” *Tract. de bilis*
natura.

Riverius, who was physician to the French King, says, “ Calculus, cum
 “ dissolvi non possit, morbum facit
 “ incurabilem.” *Cap. de ictero.*

Sylvius de la Boe, expresses himself in this manner: “ Cum difficile sit
 “ calculos ex bile ortos dignoscere,
 “ non mirum si eorundem curatio res
 “ inaudita videatur multis medicis.”
Prax. med. lib. i.

Dr Coe, and other physicians, have not dispaired of curing this dreadful disorder; but place all their hopes in endeavouring to force their passage through the biliary ducts into the intestines. This is always uncertain and dangerous, generally impracticable.

It is therefore surprizing, that practitioners have not attempted to dissolve them whilst in the body. Solvents are universally given in cases of urinary calculi; stones in the gall-bladder are perhaps as frequent a disease, generally more painful, always more dangerous to life.

I have however some reason to believe, that they may be easily dissolved when in the body; for in the course of a series of experiments made upon them out of the body, I found out a method of effecting it with great ease and rapidity. I have only had an opportunity of reducing it to practice in one case, but with a happy effect, but if I have the satisfaction of finding it answer upon further trials, it will give me great pleasure to make it known.

A gentleman of rank, between fifty and sixty years of age, after being in an active sphere of life, and for many years exposed to the influence of different climates, too suddenly took to a sedentary way of living. This gradually brought on a declining state of health, and for the last nine months, he laboured under many of the severest symptoms of the second stage of this disorder. The fit was exceeding violent, continuing several hours, and came on with much regularity about eight in the evening. He had indeed frequent attacks at uncertain times between whiles, which, though pretty severe, were short and transient

transient if compared with the other. All means were tried that skill and prudence could suggest, notwithstanding which he grew daily worse, opiates being the only remedies which procured any considerable relief.—Chancing to mention to him the result of my experiments, he was very pressing that I would try its effects in his case, which was at length consented to. On the third day after, beginning the use of the medicine, his urine from a saturated blackish brown colour became more natural, depositing when cold a pinky, and at length a lateritious sediment. This gave me great hopes, notwithstanding his pain and other symptoms continuing as before. The fits were much diminished both as to violence and duration in a few days after this, and in a fortnight quite gone off; a sudden bilious diarrhœa came on and lasted two or three days, which was tinged with blood, though without the least pain. This was undoubtedly caused by the discharge of the bile, the ducts being now open and pervious; since this he has never required the assistance of an opening medicine, which
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he had been before long necessitated to use. It is now upwards of two months since his fits ceased, is in better health than for some years last past, is able to use a great deal of exercise, and seems in every respect cured.

The medicine never disagreed in the least with the patient; but on the contrary caused a sense of warmth in the stomach, which was very agreeable, and diffused itself to the extremities, which, during the course of the disease, were always colder than when in perfect health.

If the stones cannot be dissolved, the method of cure consists in endeavouring to dislodge them by mechanical action; at the same time palliating the violence of the symptoms.

The symptoms of the first stage give but little insight into the nature of the primary disease, being chiefly what are called nervous, and will be generally treated as such.

But a perfect knowledge of the nature of the bile and its important uses in the animal œconomy, will lead us to suspect by such signs of a disordered digestion, some fault in that fluid.—

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If to these be joined a yellow tinge in the white part of the eyes, or fallow cast in the complexion, the disorder is more evident.

The symptoms of this stage are obviated by aromatics, bitters, antia-cids, opening medicines, and suitable diet. Their effects are easily understood, from what has been said about the nature and use of the bile, in a former part of this essay.

But if there be great reason to suspect the primary disorder to be calculous concretions in the gall-bladder, there is reason to hope that they may now be easily brought away before they have acquired any considerable size, or solidity.

This intention is frequently answered by emetics and purgative medicines, repeated as often as occasion may require, and the patient be able to bear them. These, especially the former, by the shock they give to the system in general, and more particularly to the biliary passages from their vicinity, cannot but be of great use towards dislodging and forwarding the exit of gall-stones.

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The use of exercise, especially upon horseback, must not be neglected during this stage of the disease. As the gentle concussions it gives to the body, will greatly help to prevent further concretions, by causing a brisk motion of the fluids, as well as assist their expulsion when formed.

When the disease has arrived at its second stage, it becomes much more obvious, and can scarcely be misunderstood by practitioners of knowledge and experience.

Here vomits are exceedingly useful; for if they fail of dislodging the gall-stones, they frequently bring up a great quantity of viscid phlegm and other impurities, to the relief of the patient. But they are now frequently impracticable from the pain they occasion; for as the stones are probably large and compleatly formed, the action of vomiting causes too great friction of them against the tender coats of the gall-bladder, and pushes them forward with too great violence into the orifice of the duct, as yet narrow and undilated. For the same reason the pain is generally exasperated

asperated by riding, exercise, and violent motion of every kind.

The costive habit of the patient, calls for the repeated use of medicines that stimulate the bowels and open the body gently.

The cure of this disease is generally attempted by alteratives, especially the decoctions of the opening roots, and of the saponaceous lactescent plants. The Baron Van Swieten greatly recommends a decoction of the above mentioned plants and grass, in whey; he gives a pint every day for three months together, with the addition of a proper quantity of *sal polychrestum*. And says, that by a long perseverance in that course, he has known some obstinate cases cured.

Soap is universally used in all icteric disorders, and is certainly well calculated by its detergent quality, to dissolve many kinds of obstructions arising from a too viscid state of the humours. But experiments shew that it has no power of action upon biliary calculi. It may however be of use by way of prevention.

The juice of the *triticum repens*, or dogs-grass, has been greatly extolled

toll'd on account of its efficacy in the cure of this disease. Which notion probably took its rise from an observation of Sylvius and Boerhaave, that gall-stones are always found in the biliary passages of cows and oxen in winter, when they chiefly feed upon hay and straw; whereas, in summer, when they eat fresh grass, they are seldom met withall.

Millepedes have been much used for the same intention. But to expect any great advantage from them, they ought to be taken alive, and in considerable quantities.

Mercury, and its preparations, are much relied upon in the same intention. It is a powerful deobstruent, but can have no effect upon gall-stones, which are not meer thick or inspissated bile, but regular compound substances, and consequently not to be decompos'd but by elective attraction.

During the symptoms of the third stage, or when they are actually forcing their way through the ducts, the method of treatment is in many respects very different from that proper in the other two stages. Here is no opportunity

opportunity of giving evacuants or dissolvents, but the intention must now be directed to diminish the spasms, and relax the ducts.

The first and chief endeavour must be to gain a truce by means of opiates. They are absolutely necessary to check the enormous vomitings, to enable the patient to retain other medicines, to abate the excessive torture, and in many cases even to support life itself.

The quantity given must be according to the urgency of the case, beginning with small doses, and repeating them till a remission of the symptoms be obtained. In this disease as well as other kind of spasms, it is surprizing to observe how well the patients bear opiates; it is a singular providence that the more necessity there is for their use, the less they affect the body when their anodyne effect is over.

It will be of use to take away some blood, especially if there be symptoms of fever, but the operation seldom requires a repetition.

Clysters are of important use, not only as they tend to procure stools, but as a kind of internal fomentation applied

applied near the parts immediately affected, and thus help to diminish the spasms, and relax the biliary ducts.

Neither are we to forget topical applications. As hot flannels, or a bladder filled with warm water applied as hot as the patient can bear, upon the pit of the stomach, and the region of the liver; to these are to be added warm fomentations of emollient herbs. A large earthen jar filled with hot water, wrapped up in flannel, and placed at the bottom of the bed, so that the patient may lay with his feet against it, has given temporary relief, and will keep warm for several hours. Sitting for some time in a warm bath, is of great service.

By such a procedure, the fit is rendered more tolerable, and of shorter duration. The signs which indicate its going off are, the pulse from hard and contracted becomes softer and fuller, the surface and extreme parts begin to have a sensible warmth, at length a universal refreshing sweat comes on with a remission of all the symptoms.

After this storm is over, we have an opportunity of trying to dissolve them,
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if there be reason to suspect the stones to remain still behind.

When the stones have got out of the biliary passages, or are dissolved, the convalescents must be very careful to guard against a relapse; which is done by a diligent attention to what has been said of the occasional causes.

As the biliary ducts, and first passages, in consequence of consent and vicinity, will remain for some time disordered, sore, weak, and too irritable; we must endeavour to strengthen them by proper tonic and stomachic medicines. In this intention, some kind of mineral waters are of important use; as those of Spaa. Dr Brocklesby, in the London Medical Essays, gives some remarkable instances of the good effects of Seltzer water as a corroborant.— Dr Hunter gives us reason to expect the same advantages from those of our island, *Vid.* his treatise on the nature and virtues of Buxton waters. Where the circumstances of the patient admit of it, I would by all means advise his going to Bath.

Regarding the diet necessary to be observed by the sick, the dictates of nature

nature ought to be observed ; the food for which the patient has the greatest desire and craving will generally agree the best, though not always agreeable with the rules of art. It may however be remarked, that they usually require nourishment of the solid and stimulating kind, as flesh meats, especially roast, fried, or broiled. Vegetables and acids should be avoided, at least used sparingly ; as they are now more liable to produce flatulencies and acidities in the stomach and bowels, through want of a sufficient proportion of bile to correct them. The same objections are to wines, and malt liquors, &c. Rum, or brandy, properly diluted, seem to be the proper liquors, being not liable to such accidents.

But above all, I would enforce the use of exercise. Walking or riding on horseback claim the first place, especially the latter, where it agrees with the patient. Riding in a carriage is only to be used when the weakness of the patient renders the other two impracticable.

If we consider the effects of exercise, as putting all the various muscles of
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the body into motion; the spring and action it gives to the solids, and the consequent increased momentum of the various circulating fluids; its great tendency to preserve, as well as restore the health of the body, is easily understood. Its most obvious good effect is the preserving all the minute vascular and capillary tubes open and pervious, by which their several contained fluids circulate through them with ease and rapidity; their stagnation and consequent concretions are prevented; all the various secretions and excretions are maintained, and the free circulation of the fluids in the extreme cuticular vessels gives a florid healthy complexion. To sum up the whole, there is no doubt but that inactivity and intemperance, are not only the occasional causes of gall-stones, and all calculous concretions in particular; but of all chronic diseases in general. Especially the latter, riding in a carriage with the patient, is only to be used with the weakness of the patient. The other two



THE END.

